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ABSTRACT

Recently, the momentum of competency based education (CBE) has increased sharply in Oregon, due in part to the public outcry against perceived failures in the K-12 public school program. CBE is a program for certifying student performance that requires demonstration of an acceptable level of skill in those areas deemed vital to success in postgraduation life roles. This document examines some of the current problems with and suggests some tangible solutions for the keeping of records being generated by CBE requirements. Four problems are addressed: (1) reducing the recordkeeping workload of the teachers, (2) reducing the efforts of maintaining the records system, (3) increasing the useful information available from it, and (4) removing the need for human judgment by making the recording and reporting more objective. Both manual and computer records systems are discussed. Sample forms are included for reader use. (Author/LD)

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Tracking and Reporting School-Leaving Competencies

KEEPING THE RECORDS DISPLAYING THE RESULTS

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Competency Based Education Program
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EA 011 330

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PREFACE

This book attempts to examine some current problems with and suggest some tangible solutions for the keeping of records which are being generated from the Minimum Competency Graduation Requirements in the State of Oregon. With more and more school districts across the nation entering into some kind of competency program, the need for a manageable recordkeeping system will become increasingly apparent.

Observations which stimulated the thoughts in this book were made in the settings of several school districts, all within Oregon. However, in commissioning the writing of this book, the National Institute of Education recognizes the value of some of Oregon's experiences with Competency Based Education (CBE) to other school districts as well.

The author wishes to thank the several school districts in Oregon that willingly supplied needed information regarding their competency recordkeeping efforts. Also, great appreciation is due personnel at the Department of Education for their help. Special thanks go to Robert Rath and Robert Gourley who reviewed drafts of this book and to those who produced it in finished form.

Charles H. Frye

INTRODUCTION

Competency Based Education (CBE) is a program for certifying student performance that requires demonstration of an acceptable level of skill in those areas deemed vital to success in postgraduation life roles. The trend is toward a formal certification of these competencies. CBE is not new, nor is its practice uniform. Its history follows several methodologies (Evans, 1976) and its implementation, several models (Schalock, 1976). Recently, the momentum of CBE has increased sharply due in part to the public outcry against perceived failures in the K-12 public school program.

In prepared remarks made before the College Entrance Examination Board Annual Meeting on October 24, 1977, HEW Secretary Joseph A. Califano called attention to growing public unrest and declining achievement among graduates:

> Amid reports of falling test scores and semi-literate high school graduates, it is no wonder that public confidence in our educational system is more often waning than waxing. In the past three years, the number of Americans rating their public schools as good or excellent has fallen almost 25 percent. And this year, 83 percent of the persons polled favored a return to basics—a return to the three R's, taught in more orderly classrooms.

> There is an insistent message for all of us in this intense concern about American education: The American people—in return for the billions of tax dollars they spend on education; in return for the great hope they invest in their children's future—are demanding that a basic level of competence, a set of minimum skills, be transmitted by our elementary and secondary schools to their students.
>
> All over the nation, parents, legislators and educators are demanding more testing as a way to ensure that the schools are teaching and the students are learning. At last count, 26 states had adopted some form of competency testing program; every other state but one was contemplating some kind of program for testing basic skills.
> (Califano, 1977)

Oregon is one of 26 states that have adopted a competency testing program for their public schools. The program was established by the State Board of Education in 1972 and is being implemented in stages over a seven-year period. Not only are the competencies to be individually certified, but evidence of their certification has been added to the list of high school graduation requirements. The Class of 1978 is the first to have competency certification added to its graduation requirements. The students must demonstrate competence in six areas (reading, writing, listening, speaking, analyzing and computing), and more will be added in 1981 when the full program is in place.

The subject of this book is limited to recording and reporting considerations which are occasioned by the regulations. The burden of that aspect of the competencies program is just now affecting schools.

Recordkeeping problems to be discussed are:

- Adequate monitoring of student progress
- Accommodation of the necessary clerical work

- Communication to teachers, students, parents, school officials and the community at large
- Varieties of competency lists
- Feeder school differences
- Transcript implications
- Exiting students who lack competencies
- Intrastate and interstate transfers
- Assignment of competencies to courses
- Effects of competency revisions
- Making up missed competencies

Discussion Guidelines

- Review of CBE Recordkeeping Discussions
- CBE Recordkeeping Systems
- Unresolved Issues Affecting Recordkeeping
- Design Goals for a CBE Recordkeeping System
- Data Source/Flow Analysis
- A Manual Tracking and Reporting System
- Computer Based Recordkeeping
- Transferring Competency Certification
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Discussion Guidelines

The author's two-month association with the Northwest Regional Educational Laboratory's CBE project constitutes his first direct exposure to the competency program. However, the concepts encountered are not new, due to the author's past experience as a public school teacher coupled with study of educational psychology and educational research. The National Institute of Education commissioned the author to write about recordkeeping for CBE because of his experience with educational computing, data management and success in exporting complex systems which had to operate in a variety of local environments. The author's knowledge about CBE was quickly acquired through:

- Reading as much as time would allow
- Briefing by Oregon CBE research professionals
- Visiting Oregon's public school officials at all levels
- Attending the hearings conducted by a Legislative Task Force investigating CBE implementation
- Contacting and visiting representatives of more than a dozen Oregon school districts
- Making several contacts and visits pertaining to the services offered by OTIS (Oregon Total Information System)

In all of the contacts, the primary concern was the keeping and reporting of competency records.

Constraints

The constraints have primarily to do with recordkeeping. Recordkeeping systems which are examined and/or recommended are to be taken in the context of CBE programs as they now exist. This book does not intend to discuss the pros and cons of the CBE program. Rather, it purports to discuss only the management of data. There will be instances where the logical implications of recordkeeping might suggest some changes in the CBE program implementation but it is not the prerogative of the author to endorse or criticize any aspects of local CBE implementations which fall outside the domain of recordkeeping.

Assumptions

Several assumptions are pertinent:

Assumption #1 is that the topic of this discussion has legal importance. Since 26 states have already enacted some form of competency legislation, the status of CBE is elevated to something more than an alternative instructional strategy and legal significance is given to the keeping of records for the competencies.

Assumption #2 recognizes a lack of uniformity or standardization in CBE implementations among Oregon's 334 school districts.

Assumption #3 admits that the rapid adoption of programs which certify competencies is largely due to the public clamor for more accountability in the schools and that the public will demand some analysis of records which will need to be kept for that purpose.

Assumption #4 asserts that educators will not long be satisfied with a program of minimum competencies but will prefer to extend the program to competencies at other performance levels.

Assumption #5 recognizes that not all school districts will have data processing support for their competencies recordkeeping system. Recordkeeping discussions must also include manual systems.

Assumption #6 acknowledges that competency lists and the competency program structure will probably continue to be dynamic in most school districts and the recordkeeping system must accommodate periodic changes.

Assumption #7 makes the supposition that the certification of minimum competencies which the districts require for high school graduation will pose a serious challenge for only about 20 percent of the students—those in danger of failing certification.

Assumption #8 alleges that experiences in implementing competency programs in Oregon will be representative of the kinds of experiences to be found throughout in the nation.

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Review of CBE Recordkeeping Discussions

School districts in Oregon have had to develop recordkeeping systems as best they could. Most were developed on an ad hoc basis with little guidance available. One effort toward providing guidance in recordkeeping for CBE programs was the development of the Oregon Graduation Requirements—Guidelines for Recordkeeping Procedures and Sample Forms, June 1974, by the Oregon Department of Education. This book takes the recordkeeping system team leader through the following steps:

1. A general overview regarding the development of a recordkeeping system
2. A review of key decisions that a district must make, revise or reaffirm
3. A summary of the procedures and documents that must be developed
4. Samples of documents that may be used
5. A statement on the implications of recordkeeping

In the book, an attempt is made toward a reasonable standardization of recordkeeping mechanics without at the same time imposing a uniformity of CBE program implementations on the districts. It is not clear what impact those guidelines have had on the districts. The suggested forms are not in general use.

A new document prepared under the title, Graduation Requirements Guidelines, Revised, (Spring 1977) reflects the change in Oregon's CBE program from "survival" competencies to "life-role" competencies. Interestingly, it omits nearly all of the recordkeeping detail found in the earlier version.

A discussion of recordkeeping is found in the Minimum Standards section of the Oregon School Law. OAR 581-22-231 (Oregon Administrative Rules) states, in part:

> (1) Student transcripts shall record demonstration of minimum competencies necessary to:
>
> (a) Read, write, speak, listen;
> (b) Analyze;
> (c) Compute:
> (d) Use basic scientific and technological processes;
> (e) Develop and maintain a healthy mind and body;
> (f) Be an informed citizen in the community, state, and nation;
> (g) Be an informed citizen in interaction with environment;
> (h) Be an informed citizen on streets and highways;
> (i) Be an informed consumer of goods and services;
> (j) Function within an occupation or continue education leading to a career.

OAR 581-22-251 discusses in detail how student transcripts are to be evaluated, both within state and from out of state. Evaluation and acceptance of completed competencies make up an important part of the discussion. OAR 581-22-258 states in detail the law concerning student records but makes no specific mention of competency records.

Thus, although minimum competencies are to be certified for graduation, and competency records must show on the student's transcript, there are no directives for including competency records as a part of the student records. Some general mention of competency records would seem well advised in the

Student Record section (OAR 581-22-258) if for no other reason than to affirm that competency records are equal in importance to attendance, grades and so on.

School-related people at all levels confirm extant difficulties in recordkeeping systems. One teacher dramatized the situation before the Legislative Task Force with an example from his teaching assignment where he was responsible for six sections of a certain class (150 students total), with nineteen competencies assigned to that class. Assuming a conservative estimate of three performance indicators per competency (his estimate), that multiplies out to 150 x 19 x 3 = 8,550 separate assessments and data to be recorded within one 18-week period, or 95 assessments per day.

The problems suggested by the foregoing example will be discussed in the section of this paper dealing with UNRESOLVED ISSUES AFFECTING RECORDKEEPING.

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CBE Recordkeeping Systems

There are essentially two categories of CBE recordkeeping systems: manual and computer supported. Fewer than half of the Oregon districts use computers to keep records and only a handful operate their own computer system. The remaining districts use manual systems.

Manual systems are usually local inventions that have evolved over the years to suit local needs.

One manual system that appears to be used more often than others is a simple matrix with students' names listed in the left margin, one per row, and competencies (and/or performance indicators) heading the columns. Some mark is made in the appropriate competency column when the student demonstrates the competence, e.g., a check mark, the date or the class. An example of one such form, taken from the Graduation Requirements Guidelines, Revised, appears in Figure 1. As simple as this system appears, it has a major shortcoming. The data are entered manually on the checkoff list and often re-entered up to a half dozen more times on other reports (e.g., report cards, counselor lists and class lists). Analysis of these lists requires laborious hand counts of the boxes checked.

COMPETENCY RECORD

Sample District Practice
Competency Record
(Class Verification)

Quarter _____

Period _____

Class _____ Teacher _____

Competency		Read Newspaper	Read Contract		Write resume'	Business letter																								
Adams, Bill	1	9/x	11/x		9/x	10/x																								
	2																													
	3																													
	4																													
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Figure 1. Competency Certification Record Form From The Oregon *Graduation Requirements Guidelines, Revised* Document.

A manual system for CBE recordkeeping that substantially reduces the clerical workload while providing detailed analytic summary information with a few minutes' work will be suggested later in this paper.

There are several computer systems for keeping competency records. Computers have been used for instructional management applications for several years. Westinghouse Learning Corporation's Project PLAN* (Flanagan, 1975) had such beginnings. Most computer manufacturers' systems involve leasing or licensing costs for the software in addition to the requirement for a specific kind of computer hardware on which to run it. Thus, only a few large districts have been able to afford that kind of luxury.

Computer support to school districts at a price many can afford is provided by OTIS (Oregon Total Information System). OTIS is operated on a nonprofit basis, serving a consortium of 64 participating school districts. OTIS offers complete data management services to schools including the keeping of competency records. The competency recordkeeping facility in OTIS consists essentially of a checkoff system, much like the manual counterpart except that analytic reports are produced as a matter of course and data are entered only once.

There are some problems with the use of the OTIS facility. OTIS is still regarded by many districts as expensive. Also, OTIS somewhat restricts local options, and operating remotely causes some mailing delays or added terminal costs. Despite these problems, OTIS provides an excellent option for school districts. Commitment to the support of Oregon's school-related data management needs gives OTIS a much sharper focus than is found in most commercially marketed systems.

More will be said about computer support for CBE recordkeeping when two new options are discussed.

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Unresolved Issues Affecting Recordkeeping

There are many unresolved issues surrounding the implementation of the minimum competency requirements. Several such issues were identified in a paper entitled, "Mid-Term Report on Oregon Schools," prepared by a Joint Task Force of the Boards of Education, Higher Education and the Educational Coordinating Commission (1977). Among the many issues raised were some that affect recordkeeping.

Variations in District Implementations

The Department of Education has encouraged local initiative in CBE implementation and has permitted a wide range of local options. Certification of competence is being accomplished in several ways, including:

- Testing, both normed and teacher-made
- Judgment from observation by teacher or others
- Demonstration of performance to an appropriate audience
- Satisfactory completion of course requirements

The recordkeeping system must accommodate all of these forms of assessment and any others which were overlooked.

Beyond the Minimums

One of the important issues among the districts is how to avoid letting the minimum competencies become the norm and how to avoid giving the minimum competencies maximum attention. Certification must be concerned with differing levels of performance. Competence is defined as a satisfactory demonstration of the student's performance when presented with certain life-role problems. These are taken to be performance indicators for the competence. However, life roles are highly differentiated and so will be the performance indicators which establish minimum competence. For example, minimum reading competence might imply different levels for an aspiring garage mechanic and a premed student.

The implications of this issue for the recordkeeping system is that the system should permit the recording of differentiated competency levels—then competencies in undifferentiated programs can be recorded just as well.

Numbers of Competencies

The range of numbers of competencies in school districts' competency lists is great—from 9 to more than 300. The average number is less than 100 and dropping. Most revisions result in fewer competencies written at higher levels of generalization. Districts with the long lists have the greatest recording burden since there are more competencies to check off.

It is wholly inappropriate to allow the student record system to dictate instructional policy, yet one cannot help but suspect that the recording workload is a major factor in many of the revisions. Competency lists of 30 or less are becoming increasingly popular.

The recordkeeping system should not impose a significantly greater burden on those districts that choose more competencies and should handle up to 100 competencies without posing a threatening workload to a district.

Transferability

Transferability refers to credit and competency evaluation for students who move from one district to another, both within the state and from outside. Concerning transfers, the Oregon Administrative Rule (OAR) 581-22-251 states the administrator shall:

> (2) Accept minimum competencies, credits and attendance completed in a standard Oregon school as if they had been earned in the administrator's own district.

Out-of-state transcripts are to be evaluated "as if the requirements had been completed in this state." Thus, a working system for translating transcripts is not only a practical necessity, it is also required by Oregon Administrative Rules.

A system will be suggested in this book which can satisfy the requirements, providing an objective method for translating in-state transcripts as well as some help for out-of-state cases.

Adequate Monitoring of Student Progress

One of the complaints frequently heard from students has been the lack of timely reminders regarding competencies yet to be completed. The record system must ensure frequent monitoring of all deficiencies, providing timely reminders to the students so that the difficiency will not be overlooked.

On the other hand, students report being overwhelmed by competency reports which show dozens of competencies uncompleted. This is like stressing the financial obligation of making all 360 payments on a 30-year

house loan. The magic of the payment plan is that we only tend to feel obligated for the current month's payment. Thus, in reports to the student, the data from the record system should stress those competencies currently in view, i.e., that need to be considered in the current forecasting.

Clerical Workload

To the budget-conscious local school administrator, competency requirements represent added curriculum efforts and added clerical duties on an already stretched budget.

The recordkeeping system should reduce the effort of entering data and make the retrieval and display easier and more meaningful. The recordkeeping system must be designed to properly divide professional and clerical labor, and should not employ people to perform tasks which can be performed faster and more economically by machines.

Dual Records Systems

One wasteful practice commonly encountered in the schools is that of maintaining a system of competency records separate from the conventional student records. In general, the better the integration of all pertinent data, the more efficient the record system will be.

Assignment of Competencies to Courses

Oregon regulations require all districts to prepare Planned Course Statements for all courses and to identify competencies being certified in each course. The assessment of minimum competencies can be regarded as an evaluation, along a different set of dimensions, of the student's performance in the same work on which he or she is being graded. The dimensional

difference in this competency evaluation can provoke recordkeeping problems. Some districts have assigned the responsibility of a single competency to more than one course. That is, two or more courses must be taken to certify a particular competency. This can cause an anomaly in the recordkeeping system. It would be easier for recordkeeping purposes to split the competency, making at least one per course. Since this is a matter of how the competency is defined, not how it is met, the record system is not dictating curriculum.

The converse situation is not a problem. Several competencies can be assigned to a single course without negatively affecting the recordkeeping system. Similarly, assigning responsibility for the same competency to several courses, where any of those courses can fully certify the competency, poses no recordkeeping difficulty.

The mistake should not be made of forcing competency certification to be associated with one or more courses, especially if opportunity is afforded for certification elsewhere. If the records are to show where the competency was certified, then all sources must be accounted for, including courses, labs, private tutoring, waivers and so on.

Effects of Competency Revisions

Revisions usually disturb recordkeeping systems since categories no longer coincide. To illustrate, suppose two competencies were collapsed into one. What should be done about the record that shows certification on one of the previous competencies, but not the other? One solution is to take time to convert all the old records to the new format, making arbitrary judgments on inconsistencies like that cited above. A less complicated solution would be to

start the incoming class on the revised competencies, changing the recordkeeping system gradually as that class moved toward graduation.

Adding categories (i.e., competencies) to the recordkeeping system is not so serious a problem since the older forms will simply be blank in the corresponding position, but collapsed competencies tend to leave data in the category being eliminated. It is often less disturbing if the deleted category (i.e., competency) is simply ignored on the form, leaving a "hole" where the previous category once was. This eliminates the laborious task of shifting all the remaining categories, and the confusion of having to find old data in a new position.

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Design Goals for a CBE Recordkeeping System

This book attempts to describe a recordkeeping system for the minimum competencies which addresses most of the issues raised heretofore. It provides a detailed description of a manual system with some options for obtaining data processing support. Thus, the system to which the design goals refer is illustrated in manual form in the following section. However, many of the goals are also valid for a much broader class of system development efforts.

Simplicity

It is appropriate that this goal should head the list since it is the universal cry of all system users everywhere. When Dr. Verne Duncan, Superintendent of Public Instruction for the State of Oregon, was asked about devising a system to keep competency records, the only advice he gave was to "keep it simple." Those same words were echoed in many school offices, particularly by those responsible for keeping such records.

Simplicity is desirable in any system so long as it is not confused with simple-mindedness. A system can be so simple that it is clumsy and inefficient.

Such is too often the case with the current manual competency record systems. The systems are as simple as a grocery list but so cumbersome that they receive continual complaints.

One such system observed by the author was so simple that it could be operated by any sixth grader, but so inefficient that the same data were being recorded in five different places, all having to do with competency completions, but none providing any kind of analysis of the student population. The secretaries who ran the system complained about the workload, yet new data were received no oftener than once a term. Questions about competency completion statistics for any definable subgroup of the student population could be answered only by hand-counting competency completion tallies, a task which had not yet been attempted. Much of the data entry time was spent "blacking in" small squares. The sorriest thing about this system was that it was one of the better designed manual systems for keeping competency records that the author had opportunity to observe.

The recordkeeping system about to be described is thought to be simple—but not in the "childish" sense. It will take training to operate it properly. Its claim to simplicity is derived from the following:

- The system can be installed and operated using as the sole resource the training materials accompanying it. If the developer must be brought in to explain it, it is not simple.
- Simplicity is designing and using the easiest affordable method for entering the relevant data.
- Simplicity requires that all participants fully understand their roles after the appointed training session(s).
- Simplicity is using ingenuity to avoid every possible redundant effort.
- Simplicity reflects the ability of the system to yield concise information in response to precise needs.

- Simplicity also means that the needed information can be retrieved quickly.
- Simplicity requires that any person who uses the system can understand it in its entirety.

Efficiency

When simplicity is achieved according to the standards in the preceding list, the system is also more efficient. Thus, several of the factors overlap. Those under special consideration are:

- Minimizing costs and effort associated with data entry
- Differentiating roles of system operators such that they are not being overpaid for the duties assigned to them
- Providing turnaround times rapid enough that people's work is not being delayed while waiting for the system to yield needed information
- Tailoring reports so each contains only those data which are pertinent to each user
- Providing system options with costs, capacities and performance characteristics to match the needs and budgets of the districts

Reliability

Districts will be using competency records systems to store data. This could cause a great deal of inconvenience if data were lost, not to mention the great legal responsibility of protecting that data against a variety of threats. Thus, the system must incorporate sufficient backup capability to avoid catastrophic accidents.

System reliability is also affected enormously by the reliability of the operators. It is usually not feasible to incorporate verification procedures for every opportunity to insert erroneous data. However, the entered information

should be reviewed for accuracy if a reasonable opportunity exists, and the design of the system should attempt to incorporate such review opportunities.

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Data Source/Flow Analysis

The book will now shift from its generalized discussion of recordkeeping problems to focus on specifics that such a system should contain. After a few basic design considerations are presented, a complete, operational system will be described.

To repeat an earlier concern, the system to be described may not meet all of a local district's requirements without some modification. Its value should be considered primarily illustrative. For example, some districts will have a hierarchy of competencies and/or performance indicators that will not be found in the illustrations even though they could be "worked in" without changing the basic operation of the system.

A very important consideration in a data management system is full understanding of the nature of the data to be processed. For a CBE Record Keeping system, which is one kind of data management system, it is important to know ahead of time what kinds of data are to be kept, where they are to come from and what will be done with them. Let us first examine the nature of the data that the system is expected to process.

Static vs. Dynamic Data

These two kinds of data need to be sorted prior to designing the record system. Static data, with respect to the CBE recordkeeping system, refers to anything that describes the CBE program, including:

- o Competency lists
- o Assignments of competencies to courses
- o Competency laboratory provisions
- o Test challenging opportunities
- o Competency certification requirements
- o Performance indicators

While these items are not static as far as the school program is concerned, and may in fact vary from year to year, they are static with reference to the student record data and provide the structure needed to organize those data. Static data can be printed in brochures and given out during orientation. Static information lays out opportunities and expectations for the student. If these items appear in the student record system, they appear as headings and can be preprinted on the forms.

Dynamic data in the CBE recordkeeping system consists of those encoded markings which describe the student's progress through the CBE program.

Default Condition

It is often desirable to ascribe meaning to a "no-entry" condition. By this is meant the condition of the entry space before it is first altered. For a manually operated record system, the no-entry condition will ordinarily be a blank space on the paper. However, this is not necessarily the case since the form could have been preprinted to show some initial entry.

The default condition is very important to the efficiency of the data system. It refers to a process of assigning some particular meaning to the no-entry case. For example, suppose that the letters "M" and "F" were to be recorded to indicate the sex of 1000 students. Exactly 1000 data entries would be required. However, suppose a default condition was chosen such that a no-entry (blank) would represent the letter "M." Then, the number of entries would probably be reduced to less than 500. Any category can include a default condition such that the no-entry is taken to mean one of the descriptors. Note that efficiency of the system is improved if the default condition is taken to signify the largest incidence of the particular category.

The pages that follow will describe a CBE record system in which competency certification deficiencies rather than completed competencies, are recorded. At first, this might appear to be the converse of the information which would normally be desirable in the records but the description of the system will attempt to show how the same competency information will be maintained by this method with much less effort. The reduced effort is attributable to the probability that relatively few of the students will have competency deficiencies (earlier assumed to be 20 percent or less). The default condition can then be used to represent the 80-plus percent of the students who have no competency deficiency, thus requiring no entry in the records. The final test of whether this method of recording is satisfactory rests with the ability to extract relevant information from the record system at the time and in the form that it is needed. After reading the full description of the system, the reader should find all reporting needs fully satisfied.

One obvious problem is that every student will be deficient at some point in his or her schooling. However, since there is so much efficiency to be

gained by this method, we can simply redefine deficiency to mean noncompletion of competency certification by the time normally expected. Thus, as with the house payments, one doesn't owe until a payment is missed.

In other terminology, this will be a system that reports only exceptions.

Reporting Exceptions

Exceptions will be the basic data entered into the recordkeeping system. This simple rule seems to have been overlooked by the majority of the districts. Much of the workload observed in the school offices and classrooms pertained to some technique for recording those who passed the competency criteria, at or near the time they were passed. Since nearly all passed, it would have reduced the effort manyfold if only the failures had been recorded. The records could have just as easily been interpreted, and those with deficiencies more easily spotted on less cluttered record forms. Thus, exception recording will be the method chosen for the present system, for both teacher reports and permanent records.

Since exceptions rather than certifications are being recorded, a competency test that is passed outside normal procedures must be recorded. Thus, the most common method of passing the competency requirement—usually in the class to which the responsibility for the competency has been assigned—will be chosen for the default condition. An exception will consist either of a failure to pass the competency test in that class, or success in passing the test some other way. These two conditions (and only these two) will be reported by the teachers and entered into the system.

This plan leaves one uncertainty, a matter that must be resolved by an administrative decision: namely, what about the student who passes a

competency and happens to be enrolled in another class where that competency is tested again? If the student fails this time, should the failure be reported? Is the student expected to have mastered the competency in such a way that it can be demonstrated at any time up to graduation? The administrative answer to this question will decide how that particular case is to be reported. Assigning the same competency to two required courses could make the problem surface. This paper will take the position that the student should maintain proficiency in the competency, and that failure on any test of that competency would signify a deficiency. If the other position is taken, the data entry procedures can be adjusted accordingly.

Thus, the total data collection will consist of the following two kinds of reports:

1. A list, generally prepared by teachers, of all students who fail a competency test given in the normal programmed setting

2. A list, prepared by teachers or counselors, of all students who receive credit for passing a competency requirement any other way (including a waiver)

The default (no-entry) condition in the records will be interpreted to mean that the student is not deficient with respect to that competency. This could occur because:

1. The student is not far enough along in the school program that demonstration of that competency is expected, or

2. The student has passed the competency test and it occurred in the normally expected setting unless an accompanying comment indicates otherwise.

This plan quite obviously requires that a "normal" place in the schooling sequence be defined in which all students except those who have been excused will be assessed for attainment of each prescribed competency, something that is almost universally done in the Oregon schools anyway.

Up to this point, the discussion about the nature of the data and the system for entering them apply both to manual and computer-based systems. However, the next two considerations apply mostly to manual systems since the capability of the computer relieves the concern if one is available.

Monitoring the Data

One important reason for implementing a CBE Record System in the first place is to assist students in satisfying all competency requirements for graduation. This means that any deficiencies should be immediately available for inspection at any time the student wishes to review them, and that students should be reminded of any competency deficiency periodically, especially as graduation approaches. A computer can search and list these deficiencies on reports quickly, easily and conveniently. Reporting can be facilitated in the manual system, too, with some properly designed procedures. We will assume that the records are in file folders, alphabetized by students' last names.

To check a student's competency status, the filing clerk can open the file and tell at a glance if deficiencies exist, and if so, what they are. Procedures for implementing this system will be described later.

The other monitoring function must be handled by someone whose job it is to check the files periodically. This record system will assign that task to the school counselors to whom, it will be assumed, students whose names fall within a given interval of the alphabet are assigned. Counselors will be responsible for periodically checking that batch of file folders which corresponds to their students. If the sole reason for checking those folders is to locate competency deficiencies, our method of tagging folders will allow

counselors to spot all deficiencies at a glance, being immediately directed to the folders of students who have at least one deficiency. The task will be performed perhaps once per term, and will require no more than ten minutes. It is then the counselor's responsibility to inform the student of the deficiency and help with the planning of a way to overcome it.

Every student will be made aware of any deficiency at least once per term, through reports containing only those competencies which should have been satisfied up to that time but have not been. This information can also be passed along to upcoming teachers through normal channels, especially where there might be opportunity to make up the competency. In addition, a file clerk can check any given student's competency status in a matter of seconds, usually by just opening the appropriate file drawer, without even opening the student's file.

Reporting the Data

Many of Oregon's school districts have avoided reporting competency data, particularly for manual systems, because of the amount of work entailed. Computers make reports reasonably easy to produce, and the main concern is restricting the report to only pertinent statistics. It is unfortunate that computer reports, which should be limited to a page or two, often are gauged by the thickness of the folded listing. This problem can be solved with better programmers or different computer programs.

The problem that requires consideration in the design of the system has to do with the analysis of the data, the results of which will be used as the basis for the report. The computer does this analysis so easily that special consideration is unimportant. However, for a manual system, the problem can be overwhelming.

Few, if any, schools who keep their competency records manually regularly produce any summary reports of the status of their competency programs. When questioned about this status, school officials usually offer estimates, largely supported more by intuition than data. The following illustrate the kinds of questions that tax most manual (and some computer) systems:

- How many students are behind in competencies?
- How many seniors are in danger of not receiving a diploma because of competency deficiencies?
- What is the average number of competencies being completed by the ___th grade?
- Which grade is having the most difficulty passing their competencies?
- What is the average competency failure rate in the ___th grade?

The vast majority of recordkeeping clerks who read the above questions would shudder at the thought of answering questions such as these. This paper proposes a manual system that would routinely answer all five questions in no more than twenty minutes. The principle involved in designing such a system is to devise a way of arithmetically accumulating data which will be pertinent to the periodic reporting as they are entered. This could be done in several ways, one of which is described in this paper. Without that accumulating, someone would have to gather data by hand every time the report was to be made, and that pretty well describes most of the present manual systems.

While checking a thousand competency lists from a school's record bank by means of a computer is a relatively trivial task, it poses something of a problem to do it manually. However, these are just the kinds of reports that an administrator needs to monitor the progress of the instructional program.

It is likely also to be highly desirable information for the Department of Education who has probably been reluctant to request it because of the work it would cause.

The record system described in this book will yield needed information with minimal effort. The reader may have questions in mind for which this system does not provide ready answers. Or perhaps another implementation method would be more acceptable. These needs can usually be satisfied by altering the design. The emphasis here is on those design principles which will produce a cost-effective records system that readily yields useful information.

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A Manual Tracking and Reporting System

This system contains a manually operated method for performing all of the tracking and reporting functions for CBE records which have been discussed earlier in this book. It is thought to provide more information with less effort than most manual systems now in use. It will also yield summary data of special interest to administrators at all levels, as well as to those in the community who have been asking what our schools are doing.

Rather than providing an off-the-shelf system, this section attempts to illustrate methods of processing data, although the system could be used as is if so desired. Data entry and reporting forms will vary according to districts' needs so they will be described here in only enough detail to illustrate how the system might work, leaving the final details to those who must use them.

While the components of this system will be described with a certain amount of precision, it is recognized that the same principles could also be implemented in other ways, perhaps with even better results. The purpose for the level of detail which shall be used is to provide the necessary specifications for a working system that delivers what has been promised.

System Overview

The system will use one manila card per student to record competency certification. The card will contain only the indications of exceptions (i.e., competencies completed ahead of schedule and/or competencies not completed on schedule). The card will be lined into vertical columns, one column per competency. Metal clip-on tabs will be affixed to the top of the column where an exception is being noted. In addition, a tab (of another color) will be affixed in a visible place on the file folder itself if one or more deficiencies have been noted on the enclosed card. (The weight of these tabs will also be shown to be useful.)

The metal tabs will be color coded: red, green and blue. Red will be used to tag the competency column in the case of a deficiency and a green tag to indicate a competency completed ahead of schedule. The blue tag will be used on the file folder to indicate one or more competency deficiencies.

The supply of metal tabs will be kept in small, secure, standard-sized boxes where the boxes are initially filled with a known number of tabs and weighed. The three colors will be kept separate, all beginning at the same count and weight. The three boxes, containing the red, green and blue tabs, respectively, will each be labeled with the name of one particular graduating class, e.g., "Class of 1979." There will be a set of three boxes per class. Thus, a three-year high school would maintain three such sets of boxes, while a four-year high school would maintain four. Class identity will be printed prominently on competency cards and only tabs from the appropriate boxes will be used.

The blue tabs will be visually obvious when the file drawer is opened. In addition, the tabs will be placed in such a way that they can be used to

conveniently open the files on which they are affixed. As the file folder is opened (without necessarily lifting it from the drawer), the tabs on the competency card will come into view. In this way a clerk or a counselor can quickly retrive competency deficiency data about individual students.

Summary information will be obtained by weighing the boxes of unused tabs. An inexpensive hand calculator can be used to convert the weight into a count of the number of tabs that are missing, i.e., that have been used to tag the folders and competency cards. These counts will be recorded each quarter. Analytic information will then be reported both from the quarterly counts and from a comparison of the current quarter to past quarters. Only three such measurements per class per quarter will be needed. Again, the hand calculator will be used in figuring all of the analytic data for the quarterly reports.

Metal tabs will be returned to their boxes after a class graduates, or when a student drops out or transfers.

Data will be entered into the competency file by a trained clerk, working from a list of exceptions submitted by the teachers. The allotted competency column will contain a preprinted identifying mnemonic for each competency, as well as extra space for comments explaining the exception being recorded. In addition, an appropriate metal tab (red or green) will be affixed to the top of the card column, and a blue tab to the file folder if a deficiency is being recorded for the first time.

After each competency card update, just prior to returning it to its folder, the card will be microfilmed and a serially-advancing number stamp device used to stamp the microfilm frame number onto the back of the

competency card. Because of the normally small number of exceptions in competency tests, this entire procedure should occupy no more than fifteen minutes of the clerk's time per class. While this is not an insignificant amount of time, it is probably no more than present methods require, and the teacher's reporting workload will be reduced to a fraction of what it often is now.

The person most in need of training will be the competency clerk. The counselor will also need minimal training to properly interpret cards. Training requirements will consist of about one-half day for the clerk and a few minutes for counselors. It will be important that the boxes of tabs are kept secure and that the files are handled only by responsible persons.

Materials Needed

The following materials will be needed to implement and operate the manual CBE recordkeeping system being described.

- A supply of preprinted competency cards. A sample card is shown in Figure 2. The card should be of the paper weight of a typical manila file folder (in fact, the cards could be cut from file folders). The competency card will measure eight by eleven inches, one-half inch narrower than normal paper size. When inserted into the file folder, the reduced width will allow metal tabs to be affixed on the edge toward the top of the file folder without protruding above it. The printing on the card will include identifying information for the student, the name of his or her graduating class, and vertically lined columns in which is printed the mnemonic representation of each of the competencies. The order of the competencies in the columns should receive careful thought. These might be organized approximately according to the expected completion schedule. Competency columns could be further broken down into performance indicator columns if desired. The competency column should have a minimum width a little larger than the metal tabs being used. If the card is too narrow to contain all of the competency columns, the card may be doubled, with the fold oriented the same as the file folder, and the front half at least one-half inch shorter than the rear half (to make all of the metal tabs show up clearly). Figure 3 shows such a card.

- A supply of red, green and blue metal tabs. A minimum of two tabs of each color for each student in the school should be sufficient. The tabs must be identical except for color (which might argue for obtaining a larger inventory at the beginning to avoid trying to match them later). The tabs will be the kind that can be affixed to the edge of paper like a paper clip. The quality of the metal must be such that the tab will hold firmly in place throughout frequent handlings. Narrow tabs are to be preferred since their width will determine the number of competency columns that can be printed on the card.

- A supply of tab storage boxes. The boxes in which the tabs are purchased might be used, although they will probably be constructed of lightweight cardboard which may not withstand three or four years of use. Small, clear plastic boxes would be better. At least three boxes per grade in the school will be needed plus a supply of extras. The boxes must weigh as nearly the same as possible since this will affect the accuracy of the later measurements. If there are obvious irregularities in the box weights, they can be equalized by adding drops of plastic cement. The boxes should be large enough to hold about 500 tabs apiece.

- A scale. A metric scale measuring grams would be best, although any high quality letter scale would do. It will be used to weigh the boxes of tabs as accurately as possible so will probably need a range of about 500 grams (16 ounces).

- An electronic calculator. A hand-held, under-$20 variety will be sufficient. Eight-digit floating point accuracy is a practical minimum, and a memory would simplify computations. This paper will describe computations in terms of a calculator with algebraic entry. If the reader is not familiar with calculators, the type described is the one most widely available. Requesting an eight-digit calculator with a memory is normally enough description. Purchasing a more expensive calculator with other options will not simplify its use for competency reports.

- Microfilm camera setup (optional). This will be a standard microfilm camera to make a backup picture-record of the competency card each time a change is made.

- Serially-advancing number stamp (optional). This stamp will be used to record the microfilm frame number on the back of the competency card.

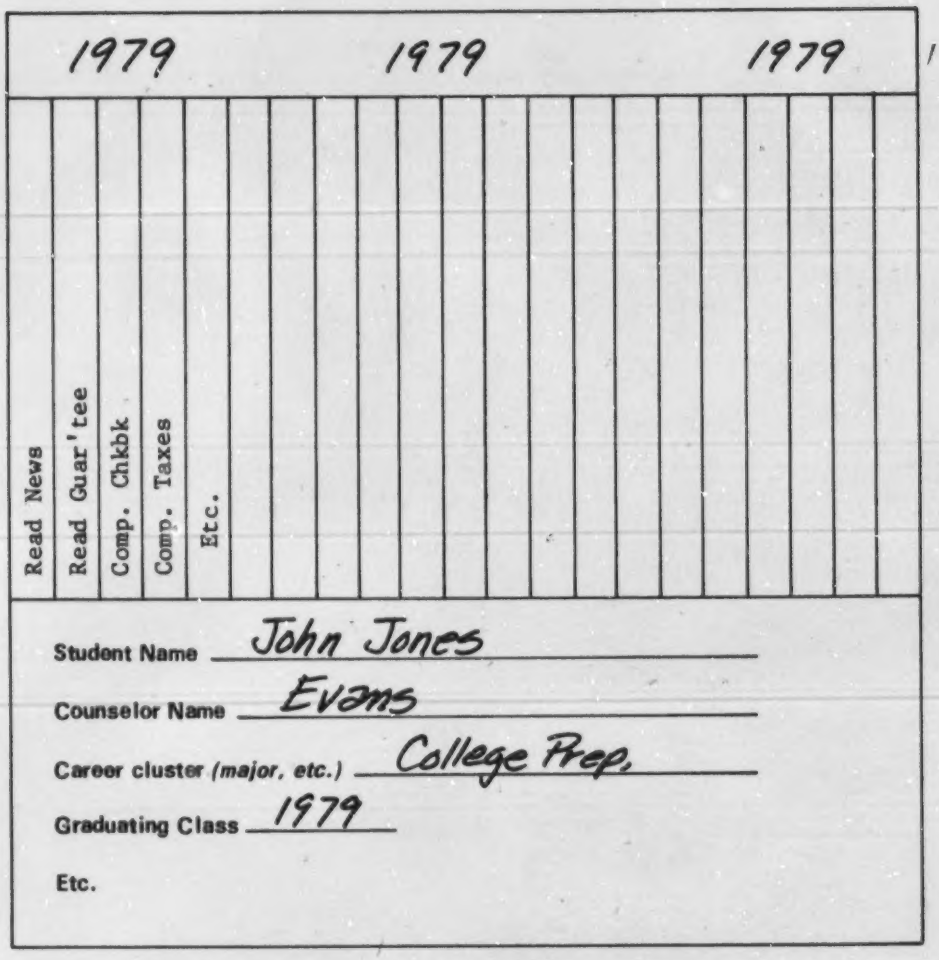

Figure 2. Example of a Competency Card (reduced size)

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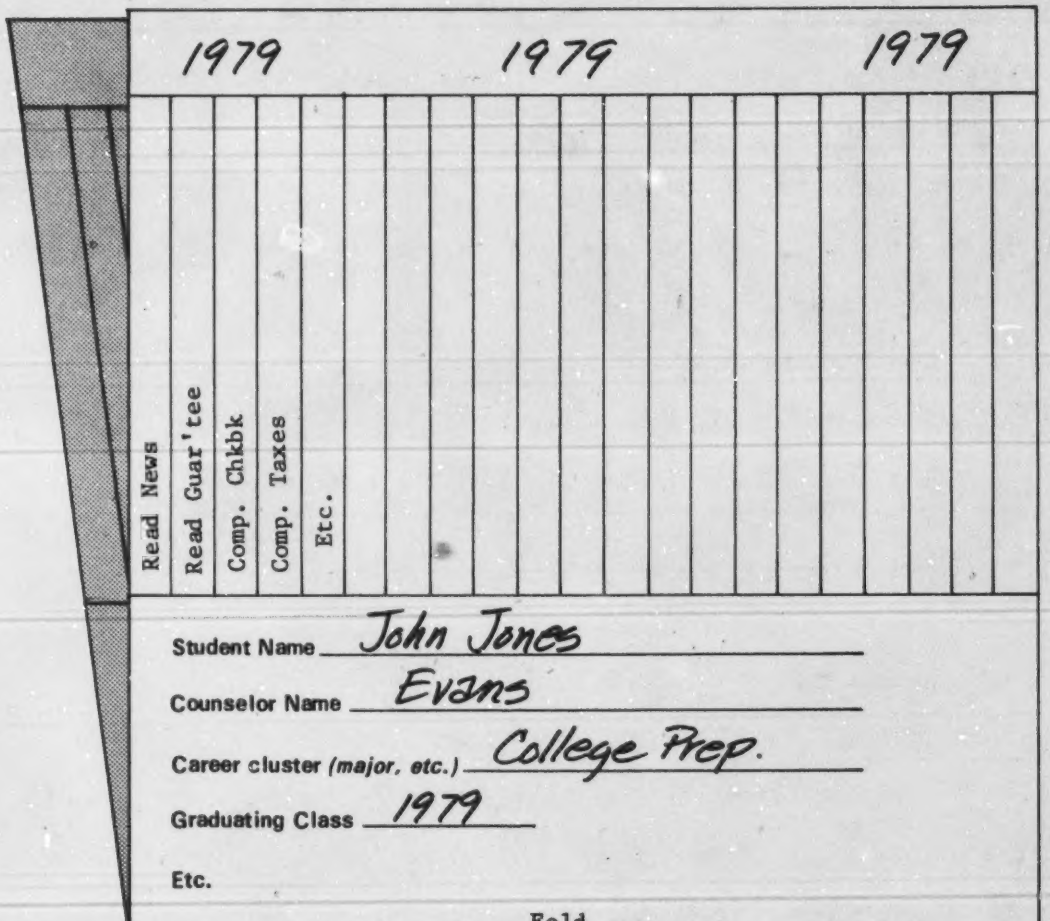

Figure 3. Example of a Folded Competency Card (reduced size). Additional competencies appear on the front face of the back flap.

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Entering Data Into the System

Two kinds of data will be entered into the system, both involving exceptional results from competency assessment: (1) evidence of competency certification ahead of the normal competency testing schedule or on a make-up test after an earlier failure, and (2) reports of failures. After the first failure, the reporting of additional failures is optional, depending on the amount of detail desired for the records.

Special forms may be devised on which to report these data or they can simply be listed on a sheet of paper and given to the competency clerk. The reports should at least contain:

- The student's name
- The identification of the competency
- The nature of the testing situation, if something out of the ordinary (e.g., competency lab, challenge, make-up, waiver, etc.)
- The outcome (pass, fail, waived)
- Name of person making report
- Course identity (if appropriate)
- Date

While this list looks long, it can be optimized by devising a reporting form that would provide boxes to check. Also, recall that these reports will only be for the exceptions which should be relatively few.

Encoding the Data on a Competency Card

Data will be encoded on the cards by the competency clerk, normally a school secretary who devotes part time to this task. The amount of time

needed is difficult to estimate accurately because it will depend on the difficulty of the competency program (i.e., the number of failure reports coming in). It should take no more than five minutes to record one competency event on the card and microfilm the card. It was earlier assumed that about 20 percent of the students would fail one or more of the competencies. Let's guess that the average failure rate among these students is about five (among the complete set of competency tests). Then among 100 students, twenty will fail a total of 100 competency tests during their three or four years in the competency testing program. Recording their eventual passes will require another 100 reports. Thus, at five minutes per event, 200 events will require seventeen hours to encode. If these estimates are realistic, that amounts to little more than a week of clerical time per year to record competency data for 1000 students in a four-year high school.

If this estimate is doubled for good measure and a week is added each school quarter to make out reports and set up the next quarter, that still amounts to only six weeks of clerical time for high schools of up to 1000 students. Note that the time is constant for deriving report data since the same number of boxes is being weighed regardless of the number of students.

The procedure for making an entry into the competency records is as follows:

1. Pull the student's competency card.
2. Locate the competency column in question.
3. If a failure is being reported, select a red tab from the appropriate box and affix it over that column. (Note: if there is evidence in the column that the competency has been passed on a previous occasion, the decision about whether to record the failure depends on the administrative decision described earlier.)

If a green tab is already on that column, leave it and do not record the failure (the competency had been challenged or waived).

If a pass is being reported, affix a green tab over the column, removing any red tab that might be there, returning it to the appropriate box.

4. Encode (through concise abbreviations) the circumstances of the report (date, class, etc.) in the column below the tab. Allow enough room for more than one recorded event.

5. Microfilm the modified card.

6. Stamp the new microfilm frame number on the back of the competency card.

7. If there are any red tabs on the card, be sure there is also a blue tab affixed to the front flap of the file folder. If there are no red tabs, remove any blue tab from the file folder, returning it to the appropriate box. (Note: there will be some advantage gained in staggering the location of the blue tabs on the file folders, for convenience in both viewing and fingering.)

8. Return the competency card to the file folder.

Some reports may contain more than one competency-related event for a given student. In that case, both events can be recorded while the competency card is pulled, and only the final form will be microfilmed.

While the list seems long for five minutes' work, note that the operations are simple and well-defined, requiring no ad hoc decisions by the clerk.

Restoring Data

Record loss can occur by loss of tabs, mutilation of the competency card, or the loss of the card. Loss of tabs is not too serious, especially if the loose tab is noticed. Missing red and/or blue tabs are likely to be noticed when the counselor sees the student next. Recall that every column which should be tabbed will also contain a comment explaining the tab. Therefore, any column containing a comment is likely to need a tab on it,

so that a missing tab will be easily noticed by anyone who examines the card. The most serious result might be the failure on the part of the counselor to pull a particular file because the blue tab was accidentally lost. This can be prevented by requesting that the counselor open the files of all assigned students at least once or twice a year and visually scan the competency card. Comments will stand out immediately because they will be few, and the correct placement of tabs will be obvious.

If the card is mutilated so that some data are not readable, the microfilm number on the back will provide access to a picture of the data as it should be. Lost or damaged tabs should be replaced from an auxiliary supply, not from the boxes, so that the count is not thrown off.

As a last resort, the microfilm records can be scanned from back to front to find the most recent picture of the student's competency card. If the card is not pictured, it was blank (i.e., that the student's competency progress was current with that expected), making it easy to replace the card. Thus, there are several levels of backup to the system, with the microfilm as a last resort.

Monitoring the Data

If one wanted competency information on a specific student, the folder could obviously be opened and interpreted at any time. Rather, the monitoring function refers to the need to periodically warn students who may be delinquent in their competency program.

This kind of monitoring will be assigned to the counselor, primarily because the counselor is responsible for students who fall within an interval of the alphabet. Thus, those competency records will be contiguous in the

file drawers. The counselor can visually scan the appropriate batch of file folders for blue tabs. Where they occur, the counselor can press the file folder open enough to see the red tabs simply by putting finger pressure on the blue tab. Rarely will any counselor have more than a few students with competency deficiencies. Therefore, it seems completely reasonable to ask the counselor to scan those files once or twice a term to note any changes. Where competency deficiencies are noted, the usual counseling procedures will be used to ensure that the student knows of the deficiency and the alternatives available to correct it.

The counselor may also have occasion to submit competency data to the clerk—for example, in the case of an approved waiver. The data should be handled the same as any teacher's report. In no case should anyone but the competency clerk alter any competency record.

Reporting an Analysis of Competency Data

This administrative report, as it will be called, relies on the process of weighing boxes of tabs. In order to make these weights meaningful, certain setup procedures must be rigorously followed. The intent will be to establish a "standard box" weight and count.

The standard tab box will be established once and for all (or until the tabs and boxes are replaced). This will be determined through the following steps:

Step 1: Setting any one of the empty, equally weighing boxes on the scale, adjust the scale to zero.

Step 2: Begin adding tabs (any one color) to the box until the scale reads some convenient round number and the box appears to have an adequate supply of tabs. An adequate supply should be 300-400 tabs per box per 1000 students in the school.

Step 3: Count the tabs in the box. If there are not enough, choose a higher number on the scale and repeat Step 2.

Step 4: When the weight of an adequate box full of tabs is exactly some convenient round number, record the weight and count of the standard box. This procedure will not be repeated as long as the same materials are used.

If at any time the "standard box" supply is found to be inadequate, a new and larger standard box can be determined and the tab count difference between the two box sizes can be used to add the correct number of tabs to all of the existing boxes. Thus, there should not be undue concern about finding the optimum box size the first time.

Each school year a new set of three tab boxes will be started. The amount of tabs to go into the box will equal the "standard box," which can be achieved by following the above four steps again, filling the box to exactly the prescribed weight (or by tab count if one prefers). For purposes of illustration, this paper will assume that the standard box steps yielded a weight of 400 grams for a box count of 359. Note that the weight of the empty box is not counted in the 400 grams since the scale was first set to zero with the empty box on it.

Where arithmetic formulas are shown, the weight of the full box will be designated W_f, the weight of the partly used box will be designated W_p, and the count of the full box will be designated C.

All three boxes (red, green and blue) will be filled in the same manner and the boxes will be labeled according to the year that the students (whose records use tabs from those boxes) are expected to graduate—three or four years hence. Boxes should be labeled with a permanent-ink marking pen, not with a stick-on label since the label will change the weight of the box. For the initial year of implementation, all boxes for each year will be set up.

As the tabs are removed from the boxes and affixed to the competency records, the weight of the boxes will decrease in proportion to the number of tabs that have been used. Thus, the boxes may be weighed at any time to determine how many tabs are gone. The following steps will ensure the most accurate estimate:

Step 1: Adjust the scale to zero with one of the empty boxes on it.

Step 2: Replace that box with the one to be weighed.

Step 3: Record the weight from the scale as accurately as possible.

Having determined the weight of the box, the number of missing tabs can be quickly calculated by the following formula:

Number of Tabs Used = $((W_t - W_p) / W_t) C$

On a calculator, enter the total weight of the standard box, subtract the measured weight of the box, divide by the total weight of the standard box and multiply by the number of tabs in the standard box. If the calculator has a memory, use it to simplify the entry of the standard box weight (or its count).

For the sake of illustration, suppose the box weighed 314 grams. The count of missing tabs would be:

((400 - 314) / 400) 359 = 77.185

This would round to a count of 77 missing tabs.

Knowing the number of tabs that has been used in the files will provide a lot of useful statistics for the administration of the program. These calculations should be done for each of the boxes (three boxes for each year of the school program) on a regular basis, probably at the end of each school term. The counts will be recorded on a form something like that in Figure 4.

SCHOOL _____ SCHOOL YEAR _____

STANDARD BOX WEIGHT _____ COUNT _____

DATE *(Term)*	RED COUNT				GREEN COUNT				BLUE COUNT				ENROLLMENT				Total
	9	10	11	12	9	10	11	12	9	10	11	12	9	10	11	12	

Figure 4. Sample Tab Count Recording Form

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It would take too much effort to illustrate all the possible administrative reports which could quite easily be made from the data kept on the form illustrated in Figure 4 but several will be suggested.

- The average competency deficiency can be figured for any class (i.e., graduating class) by dividing the appropriate red box count by the number of students in that class.
- The average competency deficiency figure for the school can be obtained by first summing all the red box counts and dividing the total by the number of students in the school.
- The percentage of students who have a competency deficiency can be obtained for any class by dividing the blue count by the number in the class, or for the school by dividing the summed blue count by the number in the school.
- The average number of deficient competencies among those who have deficiencies can be figured by dividing the red count by the corresponding blue count, either individually for the classes, or summarily for the school.

Interpretation of the green tabs may indicate how many are completing make-ups, depending on the conditions under which the green tabs are affixed.

Comparing reports of tab counts from one term to the next will show average numbers of competencies being completed for each term, or year, or any other chosen interval. Similarly, intervals in the school program where deficiencies are piling up most quickly can easily be highlighted. A profile of these data could be maintained which would give an interesting picture of the functioning of the competency program in that school. These reports are all easily derived from weighing, at the most, twelve boxes of unused tabs each term.

In general, the greater the use of preprinted forms for reporting, the more efficient the system will be. There is no need to prepare expensive forms; mimeographed ones will do fine. Where a limited number of options apply, print the options and let the users check the appropriate boxes.

Administrative reports can generally be preprinted, leaving blank spaces where numbers are to be filled in.

By making the effort at the beginning to optimize the recording, monitoring and reporting functions of the recordkeeping system, one can minimize the proportion of the competencies program which must be devoted to the mechanics of recordkeeping—which is as it should be.

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Computer Based Recordkeeping

This is not an attempt to describe a computer based system in the kind of detail shown for the manual system. In fact, the principles for the two kinds of systems will be nearly the same.

The computer based system will not use visible "tabs" but something analogous will be happening inside. Counts will be exact rather than approximate. Arithmetic will be done appropriately and reports can include all kinds of data. In fact, the real danger is in producing so many reports that they remain unread.

Data will be monitored through periodic reports supplied to teachers and counselors.

Initially, data will be encoded as in the manual system, at least for the teacher's part. The competency clerk will probably enter the reports through a typewriter terminal or some kind of punched or marked cards. One new option for data entry is to use machine-readable answer forms for competency tests (where appropriate), using the machine scoring to automatically update the data file of completed competencies. This would save several steps between testing and recording. Machines are available which can send data from test answer forms over a standard office telephone to a remotely

located computer. However, often when one speaks of what could be done, the price tag is pretty high.

Developing computer programs which make the system work is expensive. For some of the options to be discussed in this section, public funds may be attracted through a funding agency. Schools would then receive the benefit of the developmental work at virtually no extra cost. However, another excellent resource for developing needed computer programs exists within the school itself. Students constantly amaze us in the relatively short time they need to learn to program. For some reason, working on a computer seems to hold their attention as few other things do, and they persevere until the program works correctly. The results are valuable to the school as well as educational to the participating students. Several school districts are operating computers with programs developed by their own students.

The remainder of this section will suggest some possible ways that a school might afford data processing support for some or all of their recordkeeping needs.

OTIS

OTIS (Oregon Total Information System) has been described already in this paper so this paragraph will be brief. It is not the purpose of this paper to promote OTIS but failure to mention that resource would be a disservice to the reader. OTIS provides valuable data processing resources that few districts could afford on their own, and at rates ordinarily less than commercial alternatives. A district contemplating a move into data processing should at least find out what OTIS has to offer.

Surplus Equipment

Surplus data processing equipment is put up for sale daily. Some computers purchased from the surplus market for as little as a dollar have filled needs remarkably well.

Some will insist that the equipment would not be offered if it were still good. This is not true. Much of it is current production line equipment. However, it is also true that money can easily be spent for worthless equipment; therefore, great care must be taken. It is wise to get some help from a professional before a deal on surplus computing equipment is closed. Some things to be considered in such a purchase are:

- Is that computer suitable for the present need?
- Are all the components which will be needed included in the sale, and if not, how much more will it cost to acquire them from the manufacturer?
- Have any special modifications to the equipment been made for previous owners?
- Are all the component pieces part of the manufacturer's current product line?
- Has all the equipment been operating under a valid maintenance contract until now?
- What will be the added cost, if any, for an operating system and necessary compilers so the local system can be developed?
- What will be the monthly cost of a maintenance contract to cover all the equipment?
- What will be the environmental requirements (e.g., power, temperature and humidity)?

It is possible to come up with acceptable answers to all of these questions and purchase equipment at a fraction of the new cost. Educational discounts and tax write-offs often work to the advantage of the school. At the time of this writing, the author learned of a complete PDP-11 system costing nearly $100,000 being sold for $3,900, so the possibility is always there.

Computer Independent Software

Some districts now operate or have access to a computer, but are not prepared to tackle the software development effort needed to mount a CBE recordkeeping system. The Northwest Regional Educational Laboratory has acquired a great deal of experience in the technique of developing computer programs which will run on nearly all machines. Through a Laboratory program called Project PLANIT (Programming LANguage for Interactive Teaching), large instructional computer systems have been demonstrated on a wide variety of computers so that the technical approach to the problem has, by now, been thoroughly validated.

It is possible that a joint project between this Laboratory and several school districts to develop and test a computer independent CBE Recordkeeping system, patterned after the principles in this book, could attract support from a federal agency. If so, then the results would be in the public domain, so that any school district with access to any computer could mount and operate the system. The technology is available to do the job. All that is needed is a sufficiently large show of interest from the districts to convince the funding agency that the project would be worthwhile.

Micro-Computers

These little computers are proliferating more rapidly than anyone can monitor. Among the districts who insist that they cannot afford to operate a computer, it would not be too surprising to find a micro-computer in one of the student's homes. Few have a real appreciation for the capability of these machines. Most still consider them to be a toy for elaborate games and such.

As a matter of fact, their small size is deceptive. For less than $600 one can now buy a computer, the equivalent of which would have cost several hundred thousand dollars only twenty years ago, and today's version would outperform it. Micro-computers have had a somewhat limited appeal in the past few years they have been available because they were mostly sold in kits which required time and skill to assemble. However, that is rapidly changing. With companies like Radio Shack and Sears Roebuck entering the market with computers that are assembled and ready to go, options will soon become available that have not been considered.

Using Radio Shack's TRS-80 micro-computer as an example, $599 now will purchase all the necessary computer hardware and software, assembled and ready to use, to write computer programs in the BASIC language. As such, it would be a valuable instructional tool in any school.

With regard to CBE recordkeeping, however, that system is not complete. It would need a disk memory (soon to become available at about $2500-$3000), additional core memory (a few hundred dollars), and a printer (about $1500-$2500). Not all of the attachments are ready yet but when they do become available, they will probably plug-in to the basic unit without further modifications. Thus, the price for an operational configuration of a micro-computer which might handle CBE recordkeeping is closer to $6000 than to $600, but even at that, the price is well under previously available options.

There would still be a programming effort necessary to make a micro-computer do CBE recordkeeping. Such an effort could attract funding agency support if it had a broad enough appeal.

Having such a computer system for CBE recordkeeping would also make available a valuable classroom tool, especially since recordkeeping would only keep it busy for a small portion of the time.

On the negative side, micro-computers are small even in comparison to the mini-computer line that many schools use. It is somewhat doubtful that a micro-computer could be made to handle the more complex tasks such as class scheduling, room loading, inventories, book ordering, and other large data base-oriented applications. However, it still represents a relatively inexpensive way for a district to start computing, and will have suitable uses even long after the business office has outgrown it.

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Transferring Competency Certification

The problem of transfers, in regard to competency records, is the problem of translating one competency record format into another. It is not so much a matter of concern for the recordkeeping system as it is a problem of communication between recordkeeping systems.

This section will suggest a transfer system which will permit an objective translation of competency certification records between any two Oregon high schools, and will provide a means of establishing which competency requirements to waive for those students transferring from out-of-state schools. The section will assume that all Oregon schools are using the previously described system for keeping competency records; however, that assumption will not prevent the use of the transfer system with any local recordkeeping system. The assumed use of this system is solely for illustrative purposes.

Objectives of the Transfer System

These objectives include:

- Providing a means of translating competency information from one district to another in a manner so objective that it can be handled by the competency clerk

- Making the nature of the certified competency acceptably clear to the receiving school
- Providing competency equivalency information without intruding on districts' options for defining their own competencies
- Clarifying competency information in the transcript packet
- Making the system quick and easy to use

Transfer System Overview

This system calls for the Department of Education to publish a Master Competency List of which every Oregon school district's list is a subset. The task appears feasible, and should not require an undue amount of effort if certain procedures are followed. This master list should not in any way limit districts' options to define their own lists. However, for the sake of order, district lists should not normally be revised during a school year.

The Master Competency List will contain a numbering system. If hierarchical structures are deemed necessary in the master list, the numbering system should take that into account.

Every district will prepare a list of its own competencies in brochure form which can be sent with the transcript. At a minimum, the brochure must name each of the competencies, code it with the number of the corresponding competency in the Master Competency List prepared by the Department of Education, and provide boxes to check indicating the status of the one being transferred with regard to each of the competencies named on the brochure.

The receiving school will have prepared a similar list. In comparing competencies, school officials will compare the coded Master Competency List number with that coded on their own list. Agreement of the numbers

will verify that the competencies are comparable, and the student will be credited with certification of the competency in the new district.

All such transferred competency lists shall be retained in the student's cumulative folder and passed along to the next school in case the student transfers again. In this way, all previous competency certifications will be considered at the new school.

For transfers from out of state, the previous school could be sent the local district's competency brochure, together with the Master Competency List and asked to check those which apply to the work successfully completed by the student.

Master Competency List

The Department of Education will prepare a master list of competencies thought to comprehend all the competencies of the districts. Besides stating the competencies, the list will also provide a sublist of performance indicators for each competency, graduated according to the performance level of the indicator. In this way, a performance indicator can be selected to indicate at what level the competency is certified. For competencies that have no implied gradient of performance levels, one clearly written performance indicator might suffice.

All competencies and performance indicators will be written in sufficient detail to communicate the intention of the statement. No abbreviations or mnemonics will be appropriate unless they also are explained.

The competency statements and performance indicators will be classified in similar groups and numbered for easy reference.

The Master Competency List will be validated in two phases. Phase one will consist of sending the initial draft to all Oregon districts that are formulating competencies with the following instructions:

Compare your competency list to the Master Competency List and make the following notations and corrections on the master list:

1. Compare each of your competencies to the master list one by one.

2. If the competency in your list compares acceptably well with a competency in the master list, check the box beside that competency and check the box of the performance indicator which most nearly matches the performance level you expect for competency certification. If none of the performance indicators is acceptable, please list one of your own in the space provided.

3. If the competency in your list compares acceptably well with a collection of competencies in the master list, please check each of the competencies in the master list and the performance indicators under them, following the directions in step 2, above.

4. If the competency in your list cannot be found in the master list, please list that competency in the space provided and list one or more performance indicators which you accept to demonstrate competence.

5. If the competency in your list compares to parts of one or more competencies in the master list, please show how the master list competency should be divided so yours can be compared to the one part without being confused with the other part. Also list one or more performance indicators which you accept to demonstrate competence in the part which compares with yours.

6. When you have finished, each of your competencies should compare acceptably with one or more competencies on the master list, even if you have had to alter the master list to make them fit. After all alterations have been made, please be sure that none of your competencies are being compared with only a part of any master list competency but not the whole.

The results of each of these efforts will then be mailed back to the Department of Education. The Master Competency List form is suggested in Figure 5.

The returned copies of the Master Competency List will then be used to revise the master list. The emphasis will be on more complete differentiation

( ) *Competency 6.1*

BALANCE AND MAINTAIN A CHECKING ACCOUNT

( ) *PI 6.1.1*

Given a simulated series of entries, and status reports over at least a six-month period of time, the student will maintain a correct balance in a checkbook with over 50 withdrawals per month interspersed among ten to twelve deposits.

( ) *PI 6.1.2* *(P. 68, Graduation Requirements Guidelines, Revised, Oregon Department of Education, Prepublication Draft, Spring, 1977)*

Given a simulated series of entries, and status reports over at least a two-month period of time, the student will maintain a correct balance in a checkbook with over 20 withdrawals per month interspersed among three to five deposits.

( ) *PI 6.1.3*

Given a simulated monthly bank statement for a checking account the student will reconcile the bank's balance with a simulated checkbook balance.

( ) *Alternate wording of a sub-part of the above competency.*

( ) *Performance indicator for the above alternate wording.*

Figure 5. Sample Competency Statement With Graduated Performance Indicators For Use In The Proposed Master Competency List.

of the competencies so that districts will not have to divide competency statements (as in step 5) in order to achieve a match. Expansion of the master list will be expected. Reduction would occur only if there were competencies in the master list that no one had checkmarked. If the revision turned out to be so dramatic as to make local competency matches uncertain, then the process described in Phase One should be repeated with the revised master list.

Phase Two will consist of mailing the Master Competency List to the districts once again. This time the districts will be asked to code their own competency lists with the numbers from the Master Competency List. It will not be unusual for the local district to use several from the master list to achieve a match. The encoding will also include the performance indicator number which designates the acceptable level of performance to certify competence. These locally coded competency lists should then be mailed back to the Department of Education for inspection. If local districts still cannot make a satisfactory match, they should contact the Department of Education for technical assistance.

The Origin of the Master Competency List

Several competency lists now exist around the state and in literature which might be used, perhaps in combination, to form the master list. The Oregon Department of Education lists examples of competencies in its Spring 1977 prepublication draft of Graduation Requirements Guidelines, Revised. Another list has been distilled from the 10,000-plus competencies received from 105 Oregon school districts in connection with this Laboratory's Oregon Competency Based Education Project.

The task being suggested is no small one. It will require almost superhuman effort on the part of the Department of Education (or its contractor) to come up with the final competency list and performance indicators that fill the need. However, this is a one-time effort, one that is sorely needed to articulate the correspondence in competency programs across the state. Once completed, the Master Competency List can be maintained with annual updates.

Maintaining the Master Competency List

Once approved, the Master Competency List can be kept current by asking districts to report any revisions in their competency programs that would affect either their competency list or implied performance indicators. Those districts reporting revisions would again go through the Phase One revision of the master list, and then the revised list would be mailed to all districts for recoding, if necessary. If the competency revisions caused the local district to change its coding, the newly coded local competency list would be submitted to the Department of Education. Changes of this kind should tend to diminish as competency programs become better established.

Using the Master Competency List to Facilitate Transfers

Having provided a brochure with the necessary coding, the competency list which the local district sends along with (or as a part of) the transcript can be quite concise since all Oregon districts would have the Master Competency List to explain the meaning of the competencies.

Also, the district receiving the transfer student will have their competencies similarly encoded. Therefore, the task of translating competency records can be handled by the competency clerk, recording the

competencies that qualify and referring any problems to the appropriate counselor. To the extent that the foregoing procedures can be implemented, the transfer of competency records would become completely objective.

Reporting Competency Transcript Information

Of all the reports which were discussed that rely on information in the competency recordkeeping system, transcript completion will demand the closest scrutiny of the records. However, this is acceptable since the number of transfers should represent a small percentage of the student body.

The competency clerk will have enough information to complete the competency portion of the transcript from information extracted from the competency record card. The competency transcript will be similar to that shown in Figure 6 (assuming that other needed personal data appear elsewhere on the transcript). This sample transcript format contains more detail than normal but requires no extra effort to code.

There are four boxes, one of which will receive a checkmark, for each competency:

( ) The student has not yet reached the point in the school program where this competency is assessed.

( ) The student demonstrated this competency on schedule.

( ) The student has been certified for this competency based on prior work.

( ) The student failed this competency assessment and is still deficient.

The column tabs and column comments on the competency card determine whether either of the last two boxes should be checked. If the column is

SAMPLE COMPETENCY TRANSCRIPT FORM

1 = Competency assessment not yet encountered.
2 = Competency certified by normal assessment.
3 = Competency certified based on prior work.
4 = Competency assessment failed.

1	2	3	4	COMPETENCY	STATE CODE EQUIVALENTS
( )	( )	( )	( )	1. Read News	21.4.2, 23.2.1
( )	( )	( )	( )	2. Read Guarantee	27.6.3, 27.9.2, 28.1.4
( )	( )	( )	( )	6. Balance	44.1.1

Etc.

Figure 6. Sample Competency Transcript Form

blank, signifying the default condition described earlier, the clerk must consult the school's competency program brochure to determine whether that competency has yet been assessed. If not, the first box would be checked; if so, the second would be checked. If there is any doubt, the student's counselor should be able to supply the information.

Summary

The suggested solution to the problem of evaluating competency transcripts may seem to be expensive and involved. The merit of such a great effort may be questioned, and properly so. However, consider the alternative of not doing it.

Competency transcripts are presently evaluated subjectively by a member of the school staff, often a counselor. Decisions now being made on the basis of very little objective information affect a student's right to receive a diploma. If there is a doubt about the competency being considered, the student can be tested. However, there is sufficient reason to have doubts about a great many of the competencies, especially when the average competency transcript is so cryptic there is no way to know what the competencies mean. Therefore, transfer students are being subjected to massive amounts of needless testing, wasting both their time and that of the school staff. How much of this waste would it take to justify the cost of the suggested system? Who is going to consent to the task of subjectively evaluating transcripts after some irate students and parents raise a furor over a diploma that was not granted because of it?

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This book has attempted to suggest a system design for the tracking and reporting of competency records. The four critical problems which have been addressed throughout the book are:

- Reducing the recordkeeping workload on the schoolteachers
- Reducing the effort of maintaining the records system
- Increasing the useful information available from the system through modest effort
- Removing the need for human judgment from the recordkeeping system, making recording and reporting objective

Although some parts of the book, particularly the descriptions of the records and transcript evaluation systems, seem to be pat answers to very difficult and complex questions, they were rather intended to be expanded illustrations of certain basic principles which could be used to ameliorate the problems.

There is some possibility that the described systems could be implemented. The probability is greater, however, that their most valuable contribution will be to stimulate ideas for better solutions. If this book does even that much, it will have been worth the effort.

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